DOCUMENT RESUME

ED 316 205 IR 014 199

AUTHOR Nielsen, Janni
TITLE Is Artificial Intelligence Intelligent?
PUB DATE 84
NOTE 12p.; Paper presented at a Conference entitled "LEFT ALIVE" (London, England, October 29-November 4, 1984).
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Artificial Intelligence; *Cognitive Processes; *Computers; *Epistemology; *Information Technology; *Sex Differences

ABSTRACT

In order for information to be stored and processed in a computer, it must be reduced to data and organized and systematized in accordance with the rules and principles of formal logic. Reducing manifold reality to data for use by the computer results in loss of information because an arbitrary screening of data eliminates that gathered by the uniquely human modes of cognition (kinetic, emotive, and symbolic). For this reason, it is argued, it is not surprising that women are most skeptical of new information technology. The development in women--to a greater degree than in men--of kinetic, emotive, and symbolic modes of knowing has been the product of socialization and the division of labor in society, and is in opposition to the principles embodied in information technology. It is argued that the closing out of these modes of cognition resulting from the reduction of holistic experience to data is a limitation of artificial intelligence and cognitive science, and that an effort to achieve holism should be promoted. (GL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED316205

DANMARKS LÆRERHØJSKOLE
The Royal Danish School of Educational Studies
EMDRUPVEJ 101 DK-2400 COPENHAGEN NV
DENMARK

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

IS ARTIFICIAL INTELLIGENCE INTELLIGENT?

Janni Nielsen
The Royal Danish School of Educational Studies
Emdrupvej 101
DK 2400 Copenhagen NV
Denmark

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Janni Nielsen

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Presented at the conference: LEFT ALIVE
session: Artificial Intelligence
London University
29.10. 84 - 4.11. 84

IR 014199

BEST COPY AVAILABLE

"The first witness was the Hatter. He came in with a teacup in one hand and a piece of bread-and-butter in the other. "I beg your pardon, your Majesty", he began, "for bringing these in: but I hadn't quite finished my tea when I was sent for".

"You ought to have finished", said the King. "When did you begin?"

The Hatter looked at the March Hare, which had followed him into the court, arm-in-arm with the Dormouse. "Fourteenth of March, I THINK it was", he said.

"Fifteenth", said the March Hare.

"Sixteenth", added the Dormouse.

"Write that down", the King said to the jury, and the jury eagerly wrote down all three dates on their slates, and then added them up, and reduced the answer to shillings and pence".

(Carroll, Lewis: "Alice's Adventures In Wonderland", London, 1879, p. 167-68).

The jurors were right. It is too much information to have to account for. It is a lot of work to occupy oneself with the contradictions between the three statements. Just as it is too time - consuming to occupy oneself with the witnesses - even try to figure out why each of them has a different understanding of when it started. And besides, it is too unsure. Because who is really telling the truth?

It is far easier and rational to reduce this complex matter

to a simple one, and interpret all the dates as something measurable, which can be processed, by adding them. The result of the addition also gives excellent possibilities for a continued evaluation. As this within something so essential in a society as an economical frame: Shillings and pence. Pure data.

It does - however - not have very much to do with the reality, with the everyday life which the three witnesses live, and are trying to explain. But then, they are not the ones to make decisions. These are being made by others.

And it is easy and quick to work with numbers. For the sake of clearness, and in order to make a quick provision of results, it is good to systematize one's information - though it may not be an especially intelligent thing to do.

Yet this is not much different from what happens when a computer is being applied.

In order for information to be stored and processed in a computer, it must be reduced to data, and organized and systematized in accordance with the rules and principles of the formal logic. Otherwise the computer cannot function. Just as each symbol used must be uniquely defined. No room for fuzzy concepts, interpretations are not possible for a machine.

To reduce the manifold reality to data, means loss of information. Or rather essential information is done away with, because an arbitrary screening takes place apriori. Arbitrary because neither human life, nor the life of society (nor nature) is part of a linear process: it does not follow the rules and principles of the formal logic, but is constituted by sidetracking from the main road to many a by-street and forest-path. All intertwined in a very complex weaving pattern.

This is not, however, what the computer deals with. On the contrary, with the computer, like in Carroll's tale, a very complex matter must be reduced to a very simple one.

Yet it is called an intelligent machine, and it is said by some that research in Artificial Intelligence will further - and result in - the development of user friendly systems. No-

body seems to be asking, if it is a new system (there are so many already - and of all kinds) the ordinary human beings are in need of - as long as it is made friendly. Or what it is they get a chance to control - as long as control is obtained.

Not only is it termed intelligent, but the symbols which form part of the interface are called language. Which - by the way - for the sake of the user it is said, is under development, so it gets to be more like natural language.

Silly really, because no matter how much one tries to make symbols look like natural language, and no matter how happily one nods in recognition, when these symbols appear on the screen, they are still not natural language, but uniquely defined symbols, independent of context. Just like math is made up of symbols, and not language.

What I am objecting to is the misuse of concepts which have grown out of and explicitly belong to human activity.

Naming the world, applying concepts is a means for developing understanding. As such, language is an essential tool in the hands of the individual - it is a way of getting meaning out of the world. But at the same time, language exists apriori in a given culture, and in the individual meaning is superimposed by the societal universe of interpretations. Thus language also frames and shapes this understanding.

By applying concepts from human life, by naming the functions of the tool and the tool itself with concepts from human life, an understanding is generated through which we will grasp the reality. Thus by naming the machine intelligent, and referring to the symbols used when working with the machine, as language, we may gradually come to see the computer as <u>the</u> intelligence and the human being as a mal-functioning machine.

This view - and there certainly are many who see it this way - is the one which leads governments, military strategists, employers, researchers etc. to rely more on the machine than on humans. The machine is objective, rational and deals only with pure data, on the basis of which important wide-ranging decisions may be carried out. Not like many humans, they are sub-

jective and "irrational". They do not stick to facts, but tend to mix all kinds of information, experiences and individual perceptions coloured by feelings, together.

But three mistakes are being made here. Firstly, it is wrongly assumed that the characteristics of an intelligent human being, and her/his thinking, is language. Secondly, it is wrongly assumed that this language may be adequately represented by the computer symbols which are uniquely defined and independent of context. And thirdly, it is wrongly assumed that intelligent human thinking takes place as a stepwise logical process, which may be adequately represented by the machine working in accordance with the rules and principles of the formal logic.

But human intelligence is much more than that. Cognition is more than what can be put in words. We know more than we can verbalize. Spread throughout the body is a knowledge which is acquired through active interaction with and in the world we live in. Much of it is never expressed in verbal form, but remains tacit knowledge. (Polanyi, Michael: The Tacit Dimension, London, 1967).

Human Cognition.

Julie (7 years old) had been to the dentist. She had a cavity in one of her front teeth. A dentist's drill in a front tooth is really painful. When Julie came home, she was asked by the adults, how the visit to the dentist had gone. Instead of answering with words, Julie walked to the middle of the room. Her little face had a painful and - at the same time - determined expression. And Julie started turning around. She spun her little body around and around and around, as fast as she could.

Adults would hardly attempt to communicate this bodily experience so expressively and precisely with the body. They would most probably express it verbally, but the bodily experience would be embedded in the words.

Julie is using the kinetic way of cognition. The basis for this being the body and the senses, and it is through the

individual's practical encounter with reality, by the laying of hands on reality, this qualification is developed. We may call it the common sense of the body. It is not a cognition which enjoys a high priority in our culture. Despite the fact is the basis for, and maintains an essential role in the cognitive development throughout life. G. Wald, a Nobel prize winner, has expressed it this way:

> "I have often had cause to feel that my hands are cleverer than my head. That is a crude way of characterizing experimentation. When all is going well, it is like a quiet conversation with Nature".
>
> (The Molecular Basis Of Visual Excitation, i: Le Prix Nobel en 1967, Stockholm, 1969).

Not only the senses and the body, but also emotions are cognitive. The emotive way of cognition is based on the human interaction. It is formed through and on the basis of the necessary emotional relationship formed with other human beings.

The human is, from birth, a social being. A new-born child (as well as adults) depends on others. It cannot survive on its own. For survival, an interaction must be established between the child and the mother, (even if very small changes are taking place in the pattern in our society - mother is still the primary person in a child's life), in which not only the child's physical needs, clean diaper, food etc., but also its emotional needs are being met.

The emotions work as an orienting means for the child's dealing with the world. A way of dealing which is formed by the quality of the emotional relationship being offered.

The emotive cognition, like the kinetics, does not enjoy a high status in our culture. Despite the fact that is the orienting means for the child's development, and remains so also in adult life, whether or not it is made explicitly clear or hidden in a veil of mist, sometimes expressed as objectivity and rationality.

To illustrate this with the following quotation is indecent. That is why I do it."I liked to follow the workings of another mind through these minute, teasing investigations to see a relentless observer get hold of Nature, and squeeze

her, until the sweat broke out all over her and her sphincters loosened". (Quoted from Evelyn Fox Keller: Feminism as an analytic tool for the studies of Science Academy, 1983).

Emotive cognition grows out of human relations. And it is the qualification, through which the dissolution of borders between self and others is made possible. Thus the ability for caring identification with another living being (nature also perceived as living) is made possible too. It is within this frame the following statement by Barbara McClintock may be fruitfully interpreted. To her the essential dimension in scientific discovery is "to hear what the material has to say to you" ---- "the openess to let it come to you". And above all, one must have "a feeling for the organism". (Quoted in Evelyn Fox Keller: A feeling for the organism, S.F., 1983).

The third element in human intelligence is the symbolic cognition. It may be transformed through language, music, colour and form etc., but here I shall deal only with language.

In Western techno-patriarchal society, language is seen as the essential tool for the intellect, or for thinking. Intellect seems to be defined by the individual's mastering of language, the ability to let the world be represented by words, sentences - yes, even sentences which refer to sentences. Thus it is not surprising that Artificial Intelligence wrongly perceives an intelligent human as one who masters language. The form and contents of much of the research in international scientific journals seem to be caught in this misperception too. Research design, methods, results are presented in accordance with some formal structure in a complex self-referring language and numbers, in which it is often difficult to find even the presence of the picture behind the picture of the reality - let alone the reality.

But let us return to human cognition and language. The language is introduced in the mother/child interaction. In the beginning the child perceives it as sounds, but these sounds are introduced and repeated in the interaction. Slowly the

sounds become the naming of the interaction, of the relation - in which the kinetic and emotive way of cognition is embedded.

Gradually, through the use in many different situations, this naming is differentiated, and the sounds are allotted a meaning, they become concepts. But not uniquely defined concepts. Because there are no sharp borders, only fuzzy lines, where the meaning of the concept is derived from the total setting, the context. Hence language grows out of human activity, and belongs together with direct experiences, situations, incidents etc.

The language, however, may become detached from direct experiences. Through language it becomes possible to transgress the present, voice the past and the future, even think about the products of one's thinking, construct theories etc. Abstract scientific concepts may be example of this, in which concepts are defined rather by their relation to other concepts, than to the concrete reality. But even in scientific concepts language must refer to the reality, otherwise it cannot work as a means for explaining and grasping it's object. The results of mental processes must be confronted with reality, otherwise they are merely figments of the brain, text "sine con".

Yet language may become demarcated from it's basis to the extent that it becomes a pure abstraction, and no body, no senses, no human relations hold it. When it cannot be held, but is "sine con", and only text, it must be defined, and rules and principles must be made for the use of it. It is no longer language, but symbols. Math as well as computer symbols are examples of rule-ridden artificial text.

But let me return to human cognition. Though I have talked of three cognitive ways and to some extent presented them independently - they must be considered as a whole. The development of and the manifold interaction between them are the basis for human cognition and for the individual's comprehension of a coherent world.

Women and computers.

It is not surprising that women are the ones to be the most sceptical towards the wonders of the information technology. This may be partly explained by the fact that technique is not - in general - a part of girl's everyday life. The electric train belongs to the boys.

Another explanation is to be found in the way technology has been applied at work-sites. Assembly-line work is spread throughout female industrial work. Just as office automation has primarily been carried through within the traditional female jobs. Women are vere familiar with technology, but to them it has very often meant intensified work, increased control and work stress, threats of loss of work - not power and control.

A third possible explanation to women's more reserved attitude towards computers - may be found in the cognitive ways specific for women. Which, in turn, must be understood on the basis of the sex-segregated society, including gender specific socialization and gender specific division of labour.

A very essential part of women's work is the reproduction, the responsibility ? and caretaking of the physical and psychological well-being of other human beings (family). It is a kind of work which requires that the person develops certain qualifications, of which the kinetic and the emotive way of cognition is essential, as well as the symbolic (language), in which these must be embodied.

Women do tend to develop a qualified, emotive and kinetic knowledge, as well as a symbolic which is tied to context, due to their necessary caretaking of and for the living organism. It is seen especially in relation to the very small children. But also to adults, whether they be friends, lovers or husbands.

I am not saying that all women do, and that men don't develop these qualified cognitive ways. What I am saying is that it is primarily the practical activity which enables this development. To the extent that men actively participate in the reproductive work, they too have the possibility of

developing these qualifications. Though I dare suggest that we give a thought to possibility that women have a biological lead - which may or may not, of course, come to interplay - depending on the practical activity.

To understand, read and deal with the world on the basis of a kinetic, emotive and context-tied symbolic cognition, is in opposition to the principles of the information technology.

The principles and the rules in accordance with which the computer functions - the formal logic - is a contradiction to the way women deal with and think about the world. This may be why women are still standing at the station, asking where the train is going.

The computer deals only with and in data logic. A pure logic - which seems to become the ideology against which human cognition will be measured. Humans may - as mentioned - come to be seen as nothing but imperfectable machines. I am not saying that it is useless to structure and formalize information, even one's own knowledge.

I am not saying that it is a disadvantage for women or men, girls or boys - to work with computers, to formalize and organize knowledge in accordance with the rules and principles of the formal logic. Even to reduce the knowledge to data. It may be very helpful to work with reduction.

What I am saying is that working in accordance with these principles poses limitation. Just like dealing with the world on the basis of emotive knowledge has it's limitations.

The tendency is that the data logic is going to be a catching disease: The principles of the formal logic threaten to empirialize everything, and become the principles, by which knowledge will be measured, the principles by which to establish what is objective and what is scientific.

The consequence is a demarcation and a closing out of kinetic and emotive cognition from the process of development of knowledge, thinking, from human life and from scientific development. Hence insufficient knowledge becomes science.

This is very clearly the limitations of Artificial Intelligence (and Cognitive Science). Limitations we should act in accordance with! Yet these limitations are only seldom made explicitly clear. On the contrary, important political decisions are made on the basis of data processed by computers. But not only should the limitations be made explicitly clear - it is essential to go beyond the technological limits, beyond reductionism, and work with complementary knowledge and methods - work towards holism in order that development may take place.

However, as these limitations have been pointed out by taking the human being as point of departure - it also shows us how severe the threat is. Because it is not the human being who is central in our world, but development of science and technology in the name of profit.